Session 708

C++ Frameworks for Mac OS X

Mike Rosse++i
Apple C++ Frameworks Manager

You Are Here Because…

…You want to:

- Build on your current investment
- Leverage C++
- Move to Mac OS X
- Do so quickly and efficiently
- Take advantage of key Mac OS X features

Apple's C++ Frameworks are the key!

Poll of Audience

Raise your hand if you:

Poll of Audience

Raise your hand if you:

- Have an existing MacApp-based product

Poll of Audience

Raise your hand if you:

- Have an existing MacApp-based product
  - and plan to move it to Mac OS X

Poll of Audience

Raise your hand if you:

- Have an existing MacApp-based product
  - and plan to move it to Mac OS X
- Have an existing C++-based product

Poll of Audience

Raise your hand if you:

- Have an existing MacApp-based product
  - and plan to move it to Mac OS X
- Have an existing C++-based product
  - and plan to move it to Mac OS X

Poll of Audience

Raise your hand if you:

- Have an existing MacApp-based product
  - and plan to move it to Mac OS X
- Have an existing C++-based product
  - and plan to move it to Mac OS X
- Don't have an existing application in C++ but plan to build one for Mac OS X

Poll of Audience

Raise your hand if you:

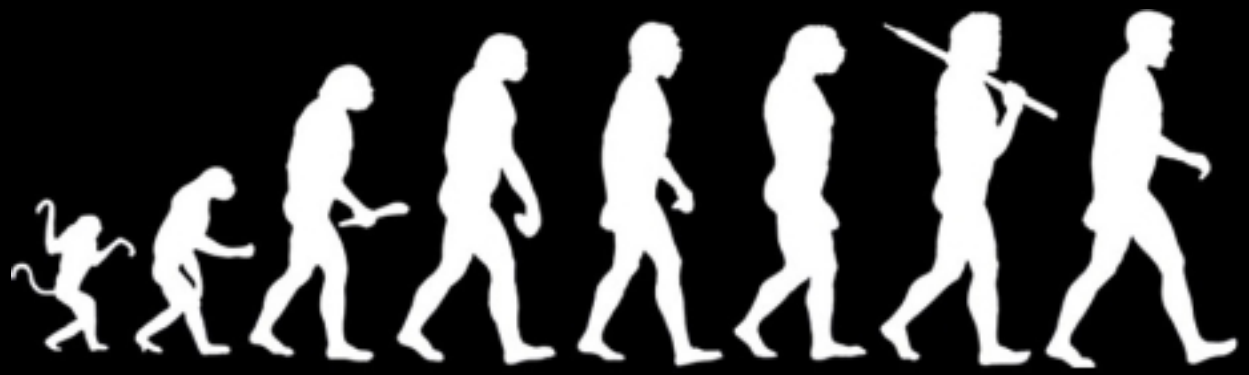
- Have an existing MacApp-based product
  - and plan to move it to Mac OS X
- Have an existing C++-based product
  - and plan to move it to Mac OS X
- Don't have an existing application in C++ but plan to build one for Mac OS X

If you answered 'Yes!' even only once: Then you are in the right session!

What We'll Discuss Today

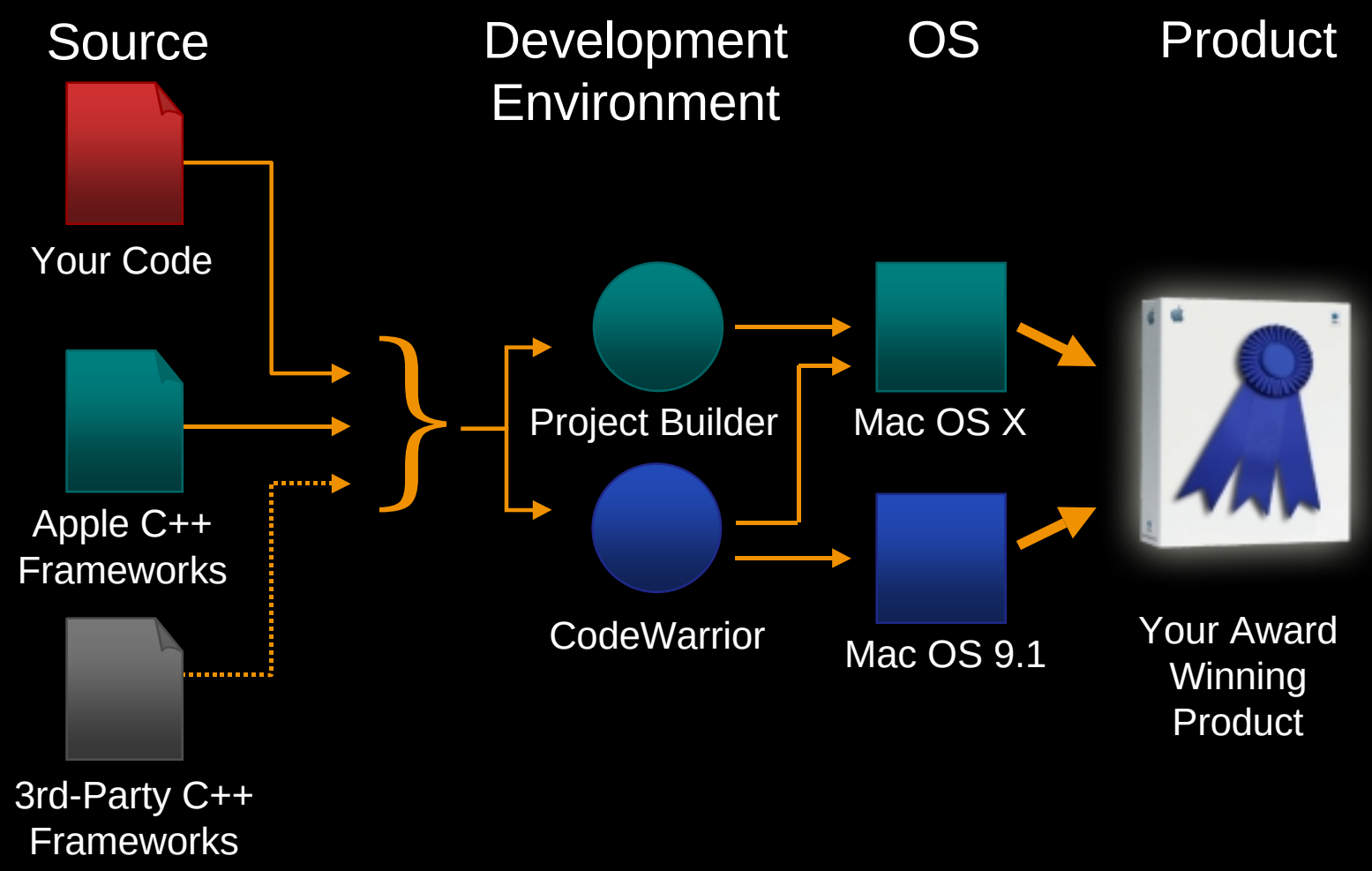
- The Apple Class Suites (ACS)
- Support for new Mac OS features
- Using the C++ standard library
- Moving C++ applications to Mac OS X
  - Using Apple's Project Builder
  - Using Metrowerks' CodeWarrior

Other Frameworks



MacApp

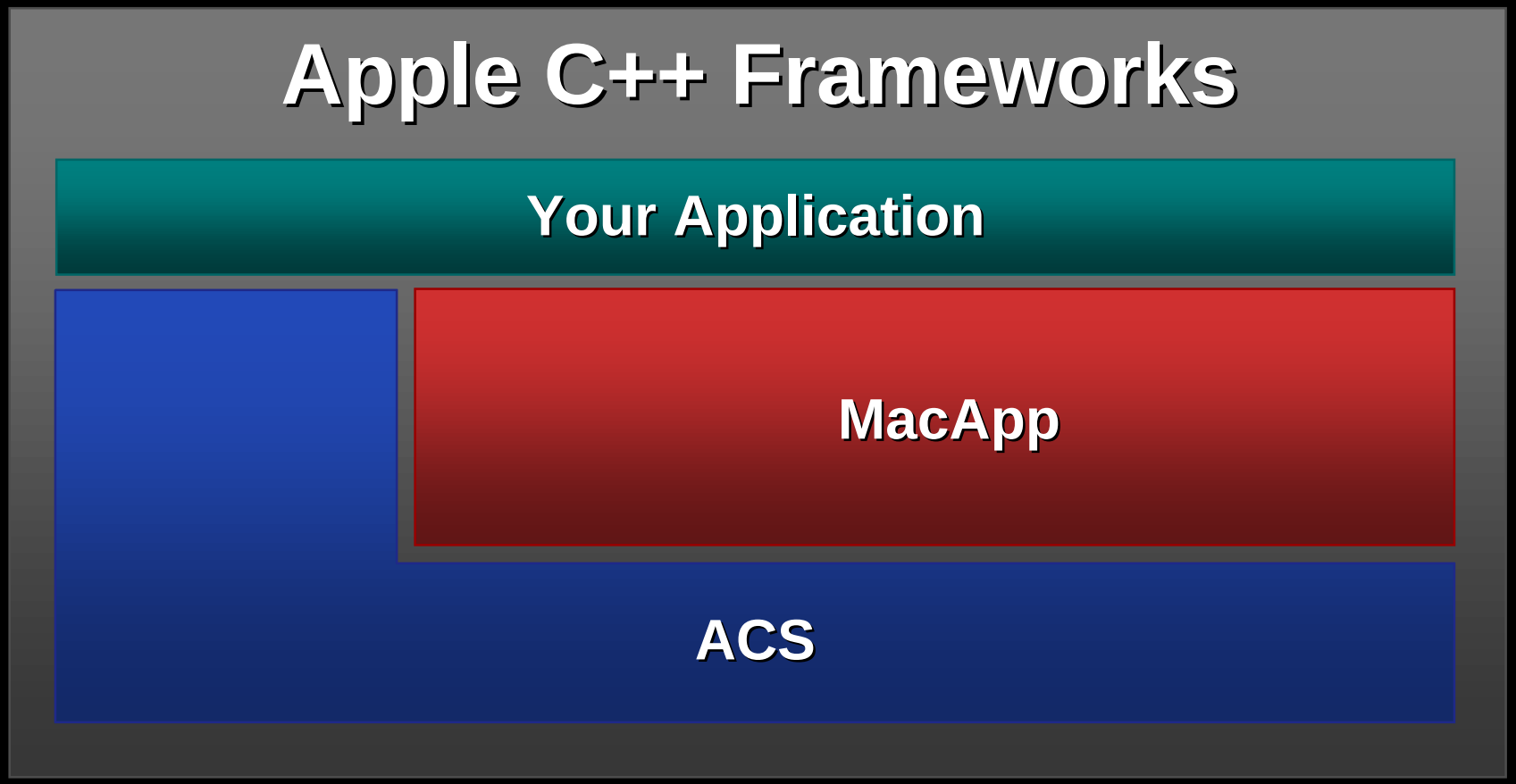
Technology Framework



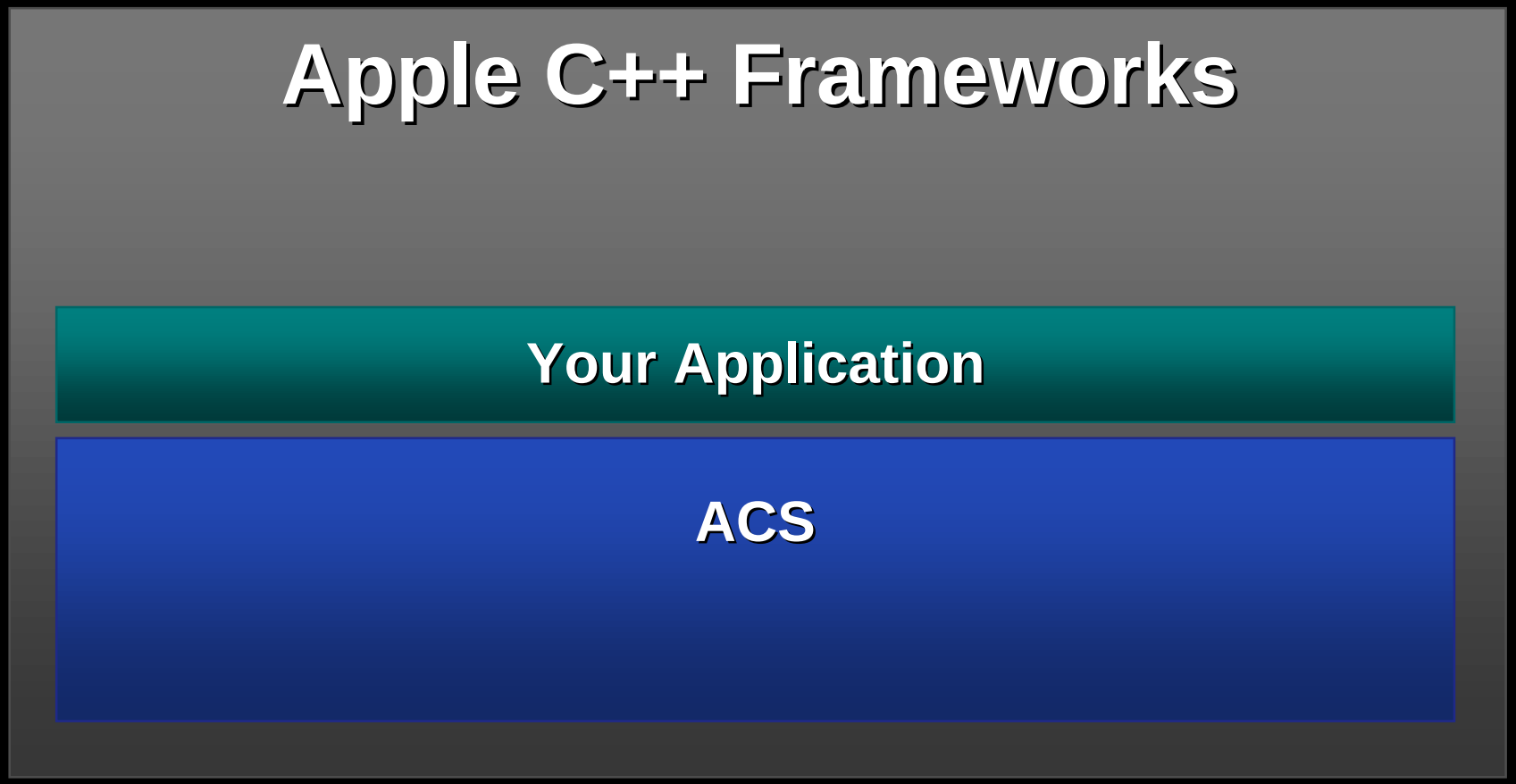
A Framework for Discussion…

- MacApp:
  - Born in 1985
  - Object Pascal —> C++
  - Patriarch
- ACS—Spawn of MacApp:
  - Mature
  - Emancipated

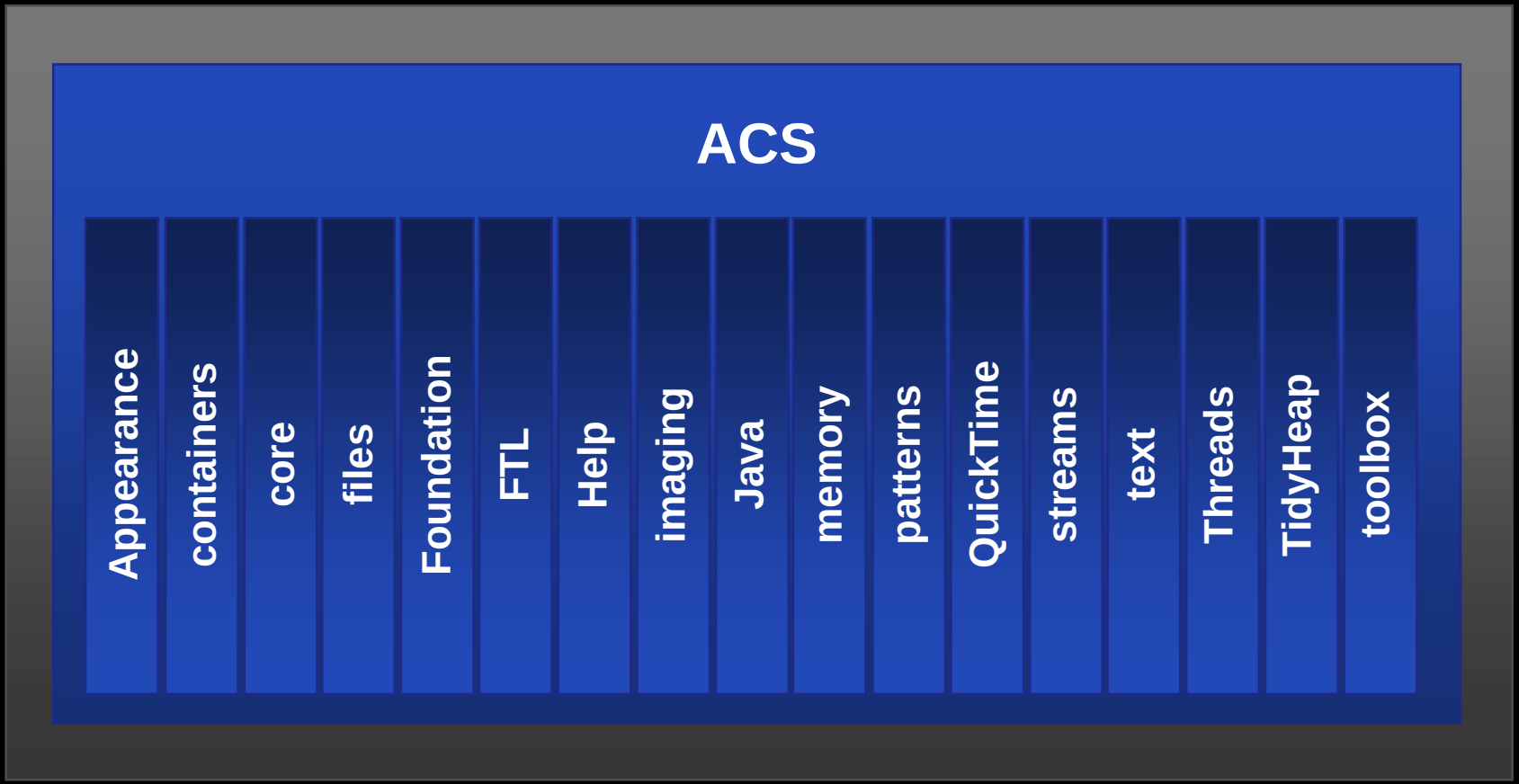
Framework Organization



Framework Organization



The ‘Sweets’ of ACS



Buzzword Enabled

- C++
  - Templates, exceptions, standard library, etc.
- Operating Systems
  - Mac OS X and Mac OS 8 and 9
  - Human Interface Toolbox, QuickTime, AppleScript, Carbon, Core Foundation, MultiProcessor Tasks, Networking, etc.
- Development Environments
  - Project Builder, CodeWarrior
  - Other frameworks such as PowerPlant

Architectural Review

Tom Becker
C++ Frameworks Propeller Head

Architectural Review

- Apple Class Suites
- C++ interfaces for Core Foundation
- C++ Standard Library and ACS
- Carbon Events

Apple Class Suites

- Utility classes for the Macintosh toolbox
- Very light weight and easy to use
- Does not require MacApp
- Check out the ACS examples folder

ACS and PowerPlant

- ACS builds with PowerPlant
- Exceptions (conditionally) based on LException
- Check out the ‘Counter’ example
- If you can’t find the class you need in PowerPlant, look in ACS

ACS Applications

- MacApp GUI
  - ACS is included with MacApp
- PowerPlant GUI
- C++ applications with other frameworks, or no framework at all
- Command line tools

Demo

Carbon Events

Foundation Suite

- Object-oriented interfaces to Core Foundation for C++ developers
- Incredibly easy to use:
  - Include the Foundation suite headers
  - Start using C++ syntax, auto-pointers, etc.

```
#include "CCFString_AC.h"
...
CFStringRef s;
...
CFIndex len = s->GetLength();
```

Foundation Template Library

- Bridge between Core Foundation and C++ STL
- Uses Core Foundation containers for storage
- APIs designed around C++ Standard Library
- Create CF containers from STL containers and iterators
- Use STL algorithms on CF containers
- FTLString is the first

C++ Standard Library

- We're making it easy to use standard types on Mac
- Our APIs are moving to C++ standard types
  - Strings
  - Containers
  - Streams
- Here's where we're at now…

C++ Standard Library

Strings

- MacApp and ACS are using standard strings now!
  - You may not notice
- Use std::string as your primary string class
- Or use CString_AC
  - Adds convenience methods for Pascal strings
- CStr255_AC will be needed only for special cases
- No more 255 character limit

C++ Standard Library

Containers

- Consider using standard containers now
  - Vectors instead of dynamic arrays and lists
  - Maps, sets, or sorted vectors instead of sorted arrays and lists
- Used internally in the framework now
- Will be used more in the future

C++ Standard Library

Streams

- Goal: move to standard streams
  - First we need to make ACS's stream features available with standard streams
  - Counting streams, handle streams, etc.
- Use ACS streams for now
- Use both ACS and standard streams if you want
  - The additional footprint is 100 KB

Carbon Events

- Carbon Events: better performance, smaller applications
- ACS's CCarbonEvent_AC provides safe and convenient access to Carbon Event data
- MacApp: built-in Carbon Event handlers and timers

fUseCarbonEvents = true;

  - Additional coding may be required
  - Contents may have settled during shipping
  - In the future, it will be automatic

Adoption

Mike Rossetti
C++ Frameworks Onomasiologist

Moving to Mac OS X

Apple C++ Frameworks makes it happen!

- Various developers
- Calc
- Apple System Profiler

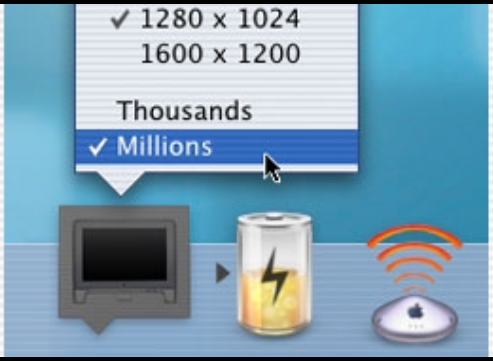
Moving to Mac OS X

Calc

- Minutes of work!
- DoNeedDiskSpace const
- Used pre-built resources

MacApp: It just works!

Apple System Profiler: A Case Study in Adoption



Mark Dawson
Apple System Profiler

Apple System Profiler

- Creates a hardware and software profile of your Macintosh
- Used by tech support
- Used by engineering to track configurations for bugs

Apple System Profiler

- Application timeline
  - First Carbon demo: last WWDC
  - Carbon CFM: Worldwide beta
  - Carbon Mach-O: Mac OS X 10.0.0

Apple System Profiler

- Quick UI transition!
  - R13 to r14/Carbonized: 2 weeks
  - R14 to r15b2/Project Builder: 3 days

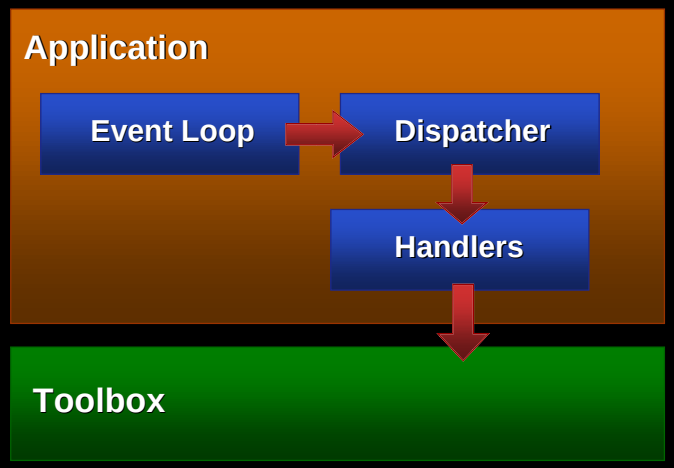
Apple System Profiler

- Learned lessons
  - Carbonizing unearthed bugs
  - GDB really helped
  - Structure alignment is compiler dependent
    - **bool** is 4 bytes in GCC,
      1 byte in CodeWarrior
    - Fixed with **Boolean**

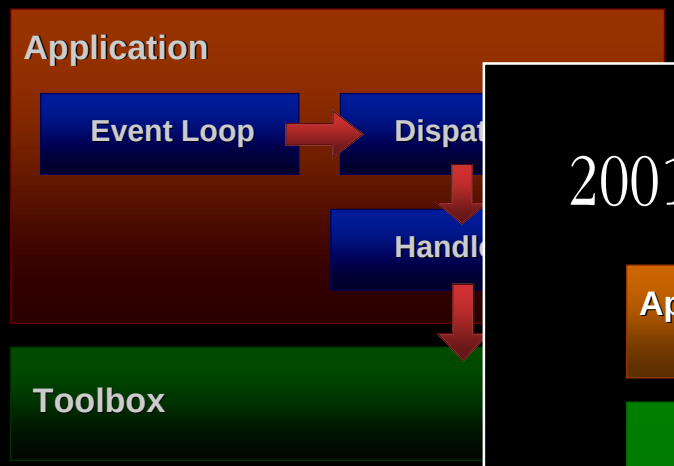
Other Thoughts

- Created a single PB project for ASP
  - Directly includes the MacApp sources
  - Directly includes the ACS sources
- Created a new static text control view

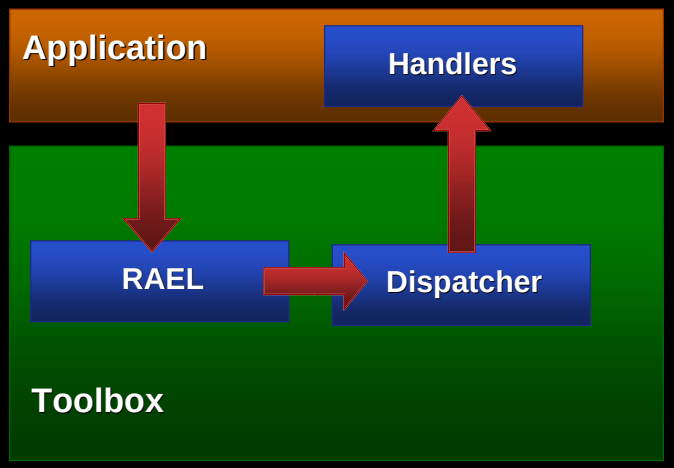
1984: Ed Still in High School



1984: Ed Still in High School



2001: Graduated 16 Years Ago



One Perspective…

Aqua

Carbon

Graphics

Darwin

. . .or Perhaps

Aqua

MacApp

Carbon

Graphics

Darwin

Release XV Features

- Project Builder support
- Core Foundation classes
- Early support for Carbon Events
- C++ standard strings are now ‘standard’
- Apple Class Suites—available by itself

Release XV Features

Project Builder

- ACS static library and ACS.framework projects
- ACS stationery
- MacApp static library projects
  - ACS incorporated into MacApp projects
- Example projects

Release XV Features

CodeWarrior Pro 6

- Carbon projects
- 68K and PPC projects
- MacApp projects now incorporate ACS
- ACS projects
- Example projects

Moving to Mac OS X

Keep in mind

- Our framework APIs have changed
- The libraries have changed
- There is a new set of tools

“Important Future Directions”

- Carbon Events
- DataBrowser
- ATSUI/MLTE
- C++ Standard Library
  - std::string (a la CString_AC)
  - Containers
  - Streams
- Unicode Strings

The Future

Godfrey DiGiorgi
Technology Manager, Development Tools

- Continue to support:
  - Developer needs
  - New Apple technologies
  - Industry standards

Information Resources

- Information pages for all Mac OS X tools
  http://developer.apple.com/tools/
- C++ Frameworks web pages
  http://developer.apple.com/tools/macapp/

- Apple's mailing list master page
  http://lists.apple.com/
- Mailing lists:
  - **macapp-dev**

Backroadmap

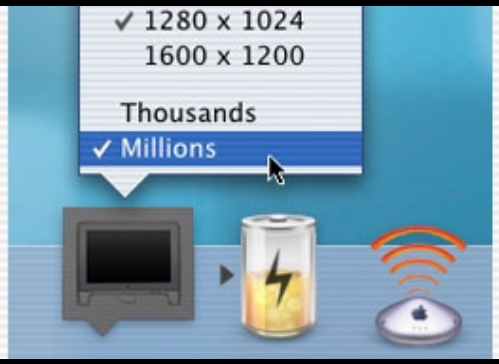
700 Mac OS X Tools Overview: The tools of our future	Hall 2 **Tues., 10:30am**
701 Project Builder Introduction: Get the most out of our favorite IDE	Hall 2 **Tues., 2:00pm**
704 Compiler Technologies: C++ compilation advancements	Room A2 **Thurs., 10:30am**
705 Apple Performance Tools: Improving your product's performance	Room A2 **Thurs., 5:00pm**
706 Debugging on Mac OS X: GDB *is* your friend!	Hall 2 **Fri., 9:00am**

Who to Contact

Godfrey DiGiorgi
Technology Management
Development Tools
ramarren@apple.com

Mike Rossetti
Manager++
Apple C++ Frameworks
rossetti@apple.com

Q&A



Godfrey DiGiorgi
Technology Manager for Development Tools
ramarren@apple.com

http://developer.apple.com/events/urls.html

WWDC
Worldwide Developers Conference 2001